

5/18/95

SUBJ: FIBER OPTIC TRANSMISSION SYSTEMS AND EQUIPMENT POLICY

1. PURPOSE.

a. General. This order establishes the policy for the acquisition and implementation of fiber optic transmission systems and equipment in FAA's communication infrastructure and assigns responsibility for ensuring compliance with this policy to the appropriate FAA organizations. The fiber optic systems and equipment include, but are not limited to, modems, multiplexers, transceivers, connectors, and fiber optic cable.

b. Life-cycle responsibilities. This order also assigns responsibilities related to fiber optic system life-cycle acquisition to appropriate FAA organizations. These systems include, but are not limited to, fiber optic modems, multiplexers, transceivers, routers, switches, bridges, connectors, and fiber optic cable.

c. Intended users. This order shall be used by program managers, acquisition personnel, and others needing policy guidance when acquiring or implementing fiber optic systems and equipment. All FAA program acquisition offices shall adhere to the policies stated in this order.

2. DISTRIBUTION. This order is distributed to the director level in Washington, with a branch level distribution in Air Traffic Service, Airway Facilities Service, Flight Standards Service, Office of Acquisitions, Office of Air Traffic Systems Development, Office of Communications, Navigation, and Surveillance Systems, Office of System Architecture and Program Evaluation; and the Office of International Aviation; to the branch level in the regional Air Traffic and Airway Facilities Divisions; to the division level at the Aeronautical Center and the FAA Technical Center; and a standard distribution to all Airway Facilities Field Offices.

3. SCOPE.

a. Applications. The policies stated in this order shall apply to all planned fiber optic transmission systems and equipment within the FAA communication infrastructure, including operational and administrative applications. These applications include, but are not limited to, surveillance radar video, DBRITE data, Airport Surveillance Detection Equipment (ASDE) data, Doppler VHF Omnidirectional Range (DODR) data, computer-to-computer communications, and Remote Transmitter/Receiver (RTR) data. Order 6650.8, Airport Fiber Optic Design Guidelines, shall be the primary reference source for airport loop systems.

b. Types of Networks. Types of networks covered by this order include, but are not limited to, Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), Synchronous Optical Networks (SONET) and asynchronous networks such as Asynchronous Transfer Mode (ATM). Applicable network architectures include Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), and point-to-point circuits.

4. BACKGROUND.

a. **Proliferation of fiber optic systems.** Fiber optic transmission systems and equipment have been implemented, or are planned to be implemented, in various portions of the FAA communication infrastructure, especially in some airport areas.

b. **Characteristics.** Characteristics of fiber optic technology include long lifetime, low maintenance costs, high reliability, high system capacity, wide user bandwidth, low transmission power requirements, immunity to electromagnetic interference and lightning-induced failures, and very low bit error ratio.

c. **Modification and development.** Some modification to existing equipment or development of hardware or software in the future may be necessary to maintain interoperability, reliability, and standardization. In these cases, the vendor shall be required to demonstrate the cost benefit of any modification to existing equipment or development.

d. **Primary reference.** FAA-STD-049, FAA Standard for Fiber Optic Telecommunication Systems and Equipment, shall be the primary reference source for all standards information when procuring fiber optic systems and equipment.

5. **AUTHORITY TO CHANGE THIS ORDER.** The Associate Administrator for Air Traffic Services, ATS-1, and the Associate Administrator for Research and Acquisitions, ARA-1, have the authority to issue changes to this order. The Administrator reserves the right to approve changes that establish policy, delegate authority, or assign responsibilities.

6. POLICY.

a. **COTS procurement.** All FAA fiber optic transmission systems and equipment shall be procured as Commercial Off-The-Shelf (COTS) equipment, except in specific cases for which development or modification is required. These systems and equipment shall conform to FAA-STD-049 and shall be capable of operating with other FAA transmission equipment to which they are connected. All development or modification associated with COTS equipment must be demonstrated by the vendor to be cost beneficial to FAA and shall conform to the provisions of Order 1810.6, Policy for the Use of Non-developmental Items (NDI) in FAA Acquisitions.

b. **Cost benefit analysis.** Fiber optic systems and equipment shall be weighed against competing technologies for specific applications. A cost benefit analysis shall be performed for all applications.

7. DEFINITIONS AND ACRONYMS.

a. **Definitions.** The following definitions are used in this order:

(1) **Multimode Optical Fiber** - Optical fiber having a relatively large core cross-section capable of transmitting light having more than one wavelength and distinguished by multiple simultaneous light wavelengths and corresponding phases. Multimode cables and systems possess a large spectral width (approximately 100 nanometers) which allows a large degree of chromatic and modal dispersion (forms of distortion) to occur.

(2) **Single-Mode Fiber** - Optical fiber having a relatively small core cross-section that allows light to be transmitted at only one wavelength and possessing a relatively narrow spectral width (approximately 4-10 nanometers). Single-mode fiber is subject to polarization modal dispersion (PMD), a form of distortion, at very high data rates.

b. Acronyms. The following acronyms are used in this order:

ASDE -- Airport Surveillance Detection Equipment

ATM -- Asynchronous Transfer Mode

COTS -- Commercial Off-The-Shelf

DBRITE -- Digital Bright Radar Indicator Tower Equipment

DODR -- Doppler VHF Omnidirectional Range

EMI -- Electromagnetic Interference

FDDI -- Fiber Distributed Data Interface

LAN -- Local Area Network

MAN -- Metropolitan Area Network

MLS -- Microwave Landing System

POF -- Plastic Optical Fiber

RFI -- Request for Information

RFP -- Request for Proposal

RTR -- Remote Transmitter/Receiver

SONET -- Synchronous Optical Network

UTP -- Unshielded Twisted Pair

WAN -- Wide Area Network

8. STANDARDS AND SPECIFICATIONS. There are large numbers of government and commercial standards and other documents related to fiber optic systems and equipment. A list of applicable fiber optic standards and other documents is provided in FAA-STD-049 (FAA Standard for Fiber Optic Systems and Equipment). In cases where modification to COTS equipment is approved, the vendor shall adhere to the provisions of Order 1810.6. Order 6650.8 shall be the primary reference source for design and implementation guidance for airport loops.

9. REQUIRED ANALYSIS. At a minimum, a study shall be required when acquiring fiber optic systems or equipment. The study will include:

a. An analysis to determine the type of fiber required, based on distances involved, bandwidth requirements, and loss characteristics of the fiber.

b. An analysis to determine the selected fiber optic link loss, transmitter power/receiver sensitivity of the transmission equipment, and optical power budget. A power budget calculation for a typical configuration shall be performed.

c. An analysis to determine the appropriate network architecture (e.g., Token Ring, FDDI, Ethernet, SONET).

d. An analysis to determine the cost benefit of fiber optics.

10. RESPONSIBILITIES.

a. **NAS Transition and Implementation** shall have the overall responsibility for implementing this order and ensuring compliance with it.

b. **Office of System Architecture and Program Evaluation** shall have the responsibility to:

(1) Maintain this order and related documents (e.g., FAA-STD-049).

(2) Review subsystem acquisition documentation (e.g., Request for Information (RFI) and Request for Proposal (RFP)) and verify that it complies with this order. Monitor the acquisition process to ensure compliance with this order.

(3) Perform studies and analyses in support of acquisition offices.

(4) Review requests for waivers to this order and provide recommendations to the Airway Facilities Service.

c. **The FAA Logistics Center** shall be responsible for maintenance and supply support.

d. **The Air Traffic Plans and Requirements Service** shall identify facilities and communications services that are required for air traffic control. **The NAS Operations Program Directorate** shall be responsible for network planning and engineering support.

e. **The Mike Monroney Aeronautical Center** shall:

(1) Review all acquisition documentation and verify that it complies with this order.

(2) Monitor subsystem acquisition throughout the procurement life cycle to ensure that the deployed subsystem is supportable.

(3) Provide logistics support for fiber optic transmission systems and equipment already procured and deployed.

(4) Provide training support (technician and depot-level repair) for fiber optic transmission systems and equipment currently deployed as well as for those procured and deployed in the future.

(5) Provide second-level engineering support for current and future fiber optic transmission systems and equipment.

f. Information Resource Managers shall:

(1) Review all acquisition documentation and verify that it complies with this order.

(2) Monitor subsystem acquisition throughout the procurement life cycle to ensure that the deployed subsystem is supportable.

g. The Regional Airway Facilities Divisions shall be responsible for identifying locations where fiber optic systems and equipment are to be installed and for their acquisition.

11. WAIVER. All requests for waiver to any portion of this order for a specific acquisition shall contain a complete justification, including the impact on system supportability. All requests for waivers shall be submitted to the Airway Facilities Service. All waivers granted to any portion of this order shall be temporary; a National Change Proposal (NCP) shall be developed for changes to a specification or other documentation.



David R. Hinson
Administrator

